U.S. Department
of Transportation
Federal Aviation
Administration

Memorandum

Subject: **INFORMATION:** Type Certificate (TC) / Technical Standard Order (TSO) Seat Issues and Their Resolution

Date: APR 0 9 2004

From: Manager, AIR-100, Aircraft Engineering Division

Reply to Attn. of:

To: Directorate Managers
Aircraft Certification Office Managers

A congressionally mandated joint FAA-industry team was formed in August 2000 to assess the certification process of aircraft seats. A goal was to identify areas within industry and the FAA that have proven to be most problematic in the seat approval process and make recommendations for improvements for a more effective and efficient process. It was determined that the seat certification process will benefit from a standardized process for resolving discrepancies discovered with seats previously approved to a Technical Standard Order (TSO).

Within the FAA, the seat approval process is typically a shared responsibility between the Aircraft Certification Office (ACO) granting the seat approval under the Technical Standard Order (TSO) system and the ACO granting approval of that seat's installation under the aircraft's type certificate (TC), amended type certificate (ATC), or supplemental type certificate (STC). For the purposes of this Memorandum, the term "TC applicant" includes applicants for TC, ATC and STC. Under this joint approval process it is sometimes difficult to determine where the TSO office responsibility ends and where the TC office responsibility begins.

In the case of TSO-C127, and TSO-C127a (TSO-C127/127a), Rotorcraft, Transport Airplane, and Normal and Utility Airplane Seating Systems, it is further complicated by the TSO requirement to collect data that will not be evaluated until the installation assessment is made against the aircraft's certification basis. Therefore part of the seating system evaluation must be completed by the ACO granting the Technical Standard Order Authorization (TSOA) or Letter of Design Approval (LODA) and part of the evaluation must be completed by the ACO granting installation approval for the product. It is understandable that this can lead to differences in the interpretation of compliance to the TSO or to the applicable airworthiness regulations based on data collected under the TSO approval.

As with any TSO article, the TSOA or LODA approves the article to a specific standard while a separate evaluation to the airworthiness standards is required to approve the TSO

article for installation in the aircraft. However, the Minimum Performance Standards (MPS) for TSO-C127 were developed, and revised in TSO-C127a, as the basis by which a dynamic seat gains FAA approval for its intended use in an aircraft. The MPS for TSO-C127/127a specify criteria toward meeting the regulatory airworthiness requirements of Title 14 of the Code of Federal Regulations (CFR) such as, but not limited to, §§ 25.561, 25.562 and some of 14 CFR § 25.785 for transport category aircraft - similar requirements exist for rotorcraft, and normal and utility category aircraft.

Improving the existing seat certification process requires: (1) increased communication between ACOs; (2) an increased willingness to understand the unique problems each ACO faces; (3) active ACO management of their TSO holders and applicants; (4) and considerable effort to follow new and existing seat policy guidance.

To give this process its greatest chance for success, a few basic assumptions should be made. First, the ACO responsible for the type certification and installation of the TSO article should recognize the approval made by the TSO ACO for each item specifically required by the MPS of the TSO. Secondly, the TSO ACO should recognize that there are part 23, 25, 27, and 29 airworthiness requirements that affect seats that are not included or evaluated under the MPS of the TSO.

An integral part of improving the seat certification process relies on resolving discrepancies in TSO seat data when they are discovered. For the purpose of this memorandum, a discrepancy is any item on a TSO-approved article that is determined to not comply with either the MPS of the TSO or the airworthiness requirements for the applicable aircraft or both. Discrepancies that involve production issues should be brought to the attention of the responsible Manufacturing Inspection District Office (MIDO).

How a discrepancy is resolved will depend on whether it is non-compliant with the TSO (including those requirements coextensive with the airworthiness requirements) or non-compliant with the applicable airworthiness regulations outside of the TSO requirements. A discrepancy is considered to fall within the TSO MPS if an assessment of the discrepant item can be made completely using only the criteria defined in the TSO including any installation limitations for that item. A few examples of items that are defined within the TSO include ashtrays, preventing fold-up armrests from extending beyond seatbacks, self-aligning restraint system anchorages, and identification of tested seat track.

A discrepancy is considered to fall outside the TSO MPS if an assessment of the discrepant item cannot be made completely using only the criteria defined in the TSO. In this case either the MPS of the TSO does not address the particular concern or is insufficient to make a complete assessment. A review of the installation limitations may determine if the item meets the airworthiness requirements.

For items that fall outside the TSO, the criteria for assessment are in the applicable airworthiness standards for that aircraft type. A few examples of items that are addressed by the transport aircraft airworthiness standards include ensuring occupant protection in

side-facing seats, the additional criteria for flight attendant seats including adequate support for head and arms, assessment of deformed seats on aircraft emergency evacuation, and Head Injury Criteria (HIC) assessment.

Resolution also depends on whether the discrepancy is discovered before or after the seat installation on the aircraft has been approved. Attachment 1, "Resolving a Discrepancy Found on a TSO-Approved Seat", shows a process to determine how a discrepancy on a TSO-approved seat should be resolved.

In accordance with 14 CFR § 21.183, the process in Attachment 1 recognizes that an applicant is entitled to an airworthiness certificate for a product with a previously approved type design as long as that product conforms to the approved type design and is in a condition for safe operation. In other words, the production certificate holder may continue to make "copies" of a previously approved design even when a non-compliance has been found as long as the non-compliance does not create an unsafe condition.

However, when the type design affecting the seat installation is changed, it must be found to comply with the applicable airworthiness standards before it is eligible for either a design or an airworthiness approval. On the other hand, if a design change to the product does not affect the seat installation the FAA has the discretion to determine that a non-compliance found on a previously approved seat installation does not prevent the aircraft from being eligible for an airworthiness certificate. The FAA would expect a plan to resolve the non-compliance be established as explained further in Attachment 1.

Discrepancy reporting serves to enhance safety and improve the overall certification process as a tool in identifying systemic problems within the seat certification process for both the FAA and the seat industry. Therefore, when a TC ACO identifies discrepancies on TSO articles, it should inform the TSO ACO. The TSO ACO should then work with the TSOA holder to resolve the discrepancy to ensure that future articles will be fully compliant.

Fundamentally, it is the responsibility of the party, FAA or non-FAA, identifying a seat discrepancy to bring it to the attention of other parties involved in the seat TSO and TC approval process. This is important so that resolutions can be developed that will have long term effect and avoid recurrence of the same problems.

Any questions or comments regarding this memo or its attachment should be directed to Hal Jensen, AIR-120, (202) 267-8807.

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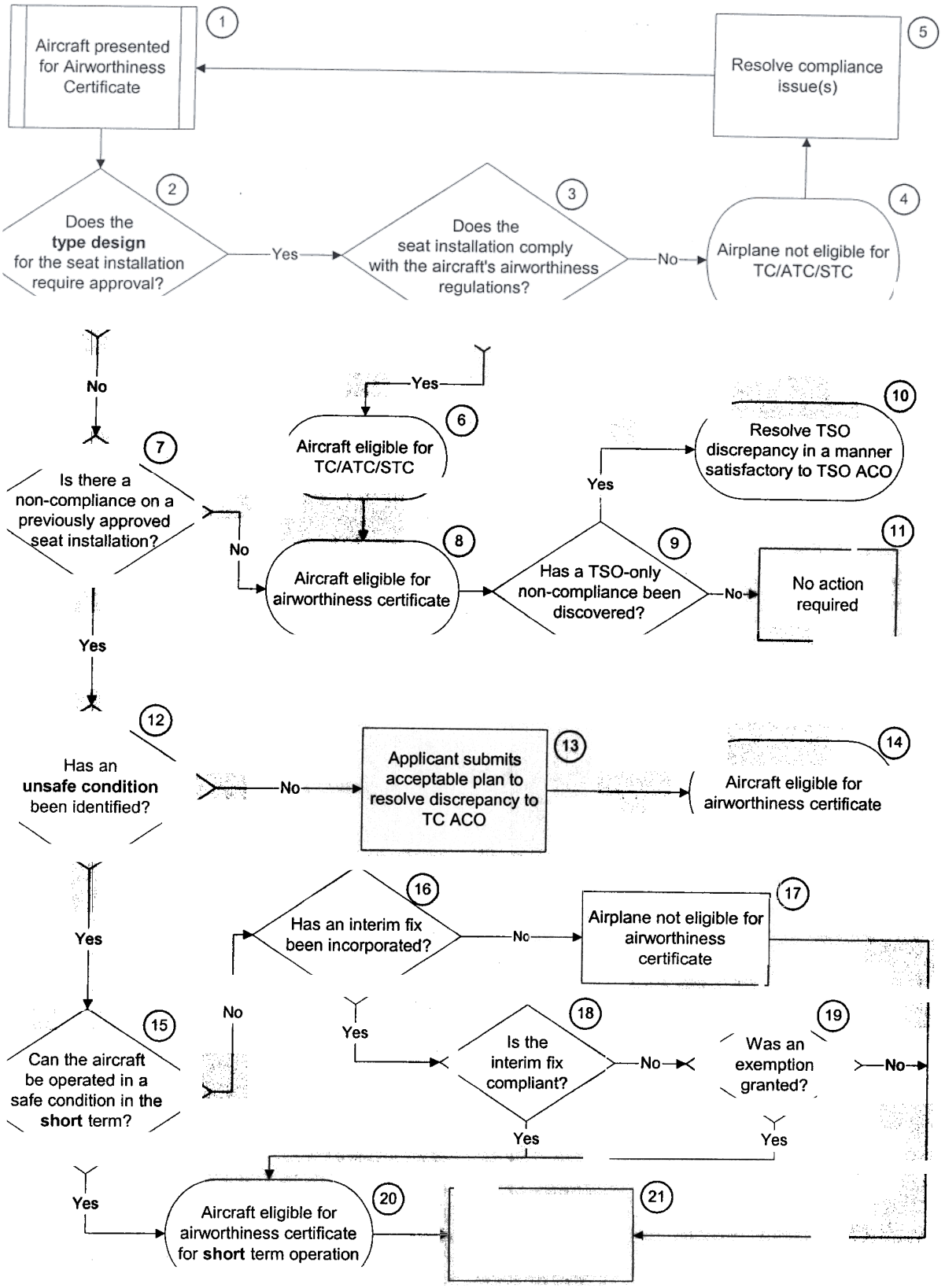
FOR David W. Hempe
Attachment

Type Certificate (TC)/ Technical Standard Order (TSO) Seat Issues and Their Resolution

Resolving a Discrepancy with a TSO Approved Seat

Attachment 1



Type Certificate (TC)/ Technical Standard Order (TSO) Seat Issues and Their Resolution

Resolving a Discrepancy with a TSO Approved Seat

Attachment 1

The following steps provide additional information and correspond, by number, to the steps in the flowchart. Note: References to "TC" or "type certificate" include type certificate, amended type certificate, and/or supplemental type certificate.

1. **Aircraft presented for Airworthiness Certificate.**
   The process starts with the assumption that the seat has already received a TSOA or LODA. Any deficiencies found during the application for TSO approval must be resolved prior to issuing the TSO approval.

2. **Does the type design for the seat installation require approval?**
   The first determination to be made is whether the installation of the TSO seats on the aircraft requires a new type design approval. Any changes to the seat design or its installation from a previously approved seat installation results in a change to the type design for the aircraft and requires a new approval.

3. **Does the seat comply with the aircraft's airworthiness regulations?**
   For seat installations that require a new type design approval, a finding must be made to determine if the aircraft meets the applicable airworthiness regulations. Although the TC ACO is expected to utilize the TSOA or TSO LODA to streamline seat certification, any non-compliances to the airworthiness requirements that are also associated with the TSO MPS can not be overlooked in the type design approval process.

4. **Airplane not eligible for TC/ATC/STC.**
   The aircraft must be compliant with the applicable airworthiness regulations before it is eligible for a type certificate, amendment to the original type certificate, or supplemental certificate.

5. **Bring discrepancy into compliance before issuing type certificate.**
   If the discrepancy of the TSO seat results in a finding of non-compliance to the aircraft's airworthiness regulations, then the aircraft must be brought into compliance before the type certificate can be issued.

   If the discrepancy falls outside of the TSO MPS, then the TC ACO accepts FAA responsibility for overseeing the resolution with the TC applicant/holder and coordinating resolution with TSO ACO. The TSO ACO defers FAA responsibility for overseeing resolution to the TC ACO. The TC ACO coordinates corrective action (AD's) as necessary.

   If the discrepancy is coextensive between the airworthiness requirements and the TSO the TC ACO should coordinate with the TSO ACO and resolve together in a manner to

promote standardization and reduce the likelihood that the discrepancy will reoccur. Typically this means the TSO ACO will take responsibility for overseeing a resolution with the TSO approval holder for compliance of discrepancies to coextensive requirements since this will resolve the discrepancy at the source.

6. **Aircraft eligible for type certificate.**
   The aircraft is eligible for a type certificate, amendment to the original type certificate, or supplemental certificate when it complies with the applicable airworthiness regulations.

7. **Is there a non-compliance on the previously approved seat installation?**
   For TC applicants that <u>have</u> previously been issued a TC for the seat and its installation, determine if there is a non-compliance of the aircraft to the applicable airworthiness regulations attributed to the seat and its installation. This does not imply that a separate and new evaluation should be done to find compliance to the airworthiness regulations on a previously approved type design. It recognizes that non-compliances are sometimes discovered on an aircraft design that has already received a type certificate. When those non-compliances are known, they must be addressed per the process outlined in the flowchart.

8. **Aircraft eligible for airworthiness certificate.**
   After the type certificate has been issued the aircraft is eligible for an airworthiness approval in accordance with Part 21 Subpart H. In general, this means a registered aircraft owner of a US registered aircraft is entitled to an airworthiness certificate once the type certificate has been issued. Exceptions to this entitlement allow the FAA to inspect the aircraft to ensure it conforms to the approved type design and is in a condition for safe operation.

9. **Has a TSO-only non-compliance been discovered?**
   On rare occasions, a non-compliance to the TSO MPS that is not co-extensive with the airworthiness requirements is discovered by the TC applicant during installation approval. This does not imply that a separate and new evaluation should be done to find compliance to the TSO on a previously approved TSO article. When those non-compliances to TSO MPS that are not co-extensive with the airworthiness requirements are known, they must be addressed per the process outlined in the flowchart.

10. **Resolve discrepancy in a manner satisfactory to TSO ACO.**
    If the aircraft complies with the applicable airworthiness regulations but there is a non-compliance to the TSO (that is not coextensive with the airworthiness requirements), the aircraft is eligible for a type certificate. However, the non-compliance to the TSO must be resolved by the TSO holder to the satisfaction of the ACO that granted the TSO approval.

In cases where the seat discrepancy involves production issues, the responsible Manufacturing Inspection District Office must be notified so they can determine when the TSO holder has satisfactorily resolved the production issue. If the discrepancy is determined to be a TSO design issue then the ACO must require the TSO holder to bring the article into compliance with the TSO. The ACO can use appropriate engineering judgment to decide how soon the TSO design changes will be integrated into the TSO holder's production of seats.

If the discrepancy falls within the TSO and outside of the airworthiness requirements, then the TSO ACO accepts FAA responsibility for overseeing the resolution from the TSO holder and coordinating resolution with TC ACO. The TC ACO defers FAA responsibility for overseeing resolution to the TSO ACO. The TSO ACO coordinates corrective action with the TSO approval holder as necessary.

11. No action required.

12. Has an unsafe condition been identified?

Any seat discrepancy that creates a non-compliance to the airworthiness regulations for an aircraft must be evaluated to determine if it creates an unsafe condition. This includes any configuration of an aircraft for which a type certificate was previously issued.

13. Applicant submits acceptable plan to resolve discrepancy to TC ACO.

The applicant must submit a plan for resolving the discrepancy that will ensure that future products comply with applicable airworthiness standards. As discussed for Box 15, in finding that a product is in a condition for safe operation under 14 CFR § 21.183, the FAA has the discretion to take into account whether an Airworthiness Directive will provide an acceptable level of safety for long-term operation. Similarly, for a non-compliant design where the discrepancy does not rise to the level of being an unsafe condition, the FAA has the discretion to require that the applicant submit an acceptable plan for resolving the non-compliance on future products, since the airworthiness regulations establish the minimum safety standards. Since the non-compliance in this context does not create an unsafe condition, the ACO can allow a reasonable amount of time for its correction, but should not allow the non-compliance to continue for longer than that.

14. Aircraft eligible for airworthiness certificate.

When it is determined that the aircraft can be operated safely in both the short and long term, and a plan has been accepted by the TC ACO for resolving the non-compliance, the aircraft is eligible for the airworthiness certificate.

15. Can the aircraft be operated in a safe condition in the short term?
The FAA can find that an airplane is in condition for safe operation if it is determined that the airplane can be operated safely during the time needed to develop and issue an Airworthiness Directive to resolve the long-term safety concern.

It is not the intent of this memorandum to define what constitutes an "unsafe" condition. A determination as to whether an unsafe condition exists should be made by the directorate responsible for the airworthiness standards for the aircraft.

16. Has an interim fix been incorporated?
The applicant may propose or incorporate an approved repair or alteration to the aircraft that will allow it to be safely operated on a temporary basis.

17. Aircraft not eligible for airworthiness certificate.
If a repair or alteration is not made to the aircraft that will allow it to be safely operated – even on a temporary basis – then the aircraft is not eligible for an airworthiness certificate. The ACO that issued the type certificate must initiate an Airworthiness Directive (AD) in accordance with 14 CFR Part 39 to address the unsafe condition.

18. Is the interim fix compliant?
Any repair or alteration that was made to allow the aircraft to operate in a safe condition must be evaluated to determine if it also complies with the applicable airworthiness regulations.

19. Was an exemption granted?
There may be rare cases where an interim fix allows the aircraft to operate safely for a specific interval even though the interim fix was not compliant with the applicable airworthiness regulations. However, in these circumstances an exemption to the applicable regulation must be granted before the aircraft is eligible for an airworthiness certificate.

20. Aircraft eligible for Airworthiness Certificate for short term operation.
The FAA can find that an airplane is in condition for safe operation if it is determined that the airplane can be operated safely during the time needed to develop and issue an Airworthiness Directive to resolve the long-term safety concern.

21. Initiate Airworthiness Directive in accordance with Part 39.
If it is determined that the discrepancy results in an unsafe condition then the ACO that issued the type certificate must initiate an Airworthiness Directive (AD) in accordance with 14 CFR Part 39.